# PATENT SPECIFICATION 647,261

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COMPLETE SPECIFICATION

## Improvements in the Manufacture of Artificial Teeth from Plastics such as Methyl Methacrylate

I, RONALD JOHN PILE, of 5, Sherwood Street, Glen Iris, in the State of Victoria, Commonwealth of Australia, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the manufacture of artificial teeth from plastics such as methyl methacrylate and the like.

Artificial teeth moulded from the acrylic resin methyl methacrylate are well-known and it is also known to mould such teeth with a transparent or substantially transparent veneer or facing to resemble the natural enamel over the dentine or basic part of the tooth.

In the manufacture of such faced teeth, it has already been proposed first to place the tooth facing in a mould and then fill the mould with the dentine portion of the tooth and finally " cure " the tooth under heat and pressure in one operation.

The object of the present invention is to provide an improved method by which a plurality of faced artificial teeth as above mentioned can be manufactured at the same time in one moulding and " curing " operation by means of quickly and easily produced working moulds, thus expediting production and reducing costs in manufacture.

The method according to the invention consists of a method of manufacturing faced artificial teeth from plastics such as methyl methacrylate which consists in casting from a permanent master pattern made from elastic or flexible material and having projecting tooth forms moulded thereon a temporary fracturable plaster working mould having a plurality of tooth cavities therein, pouring into said cavities first material to form the tooth facing and then basic or dentine-forming material, rendering the material in each cavity plastic, applying pressure and " curing " both the face-forming and the dentine-forming materials at the same time, and finally fracturing the plaster working mould to remove the finished teeth from the tooth cavities.

The invention is more fully described aided by reference to the accompanying drawings wherein:

Fig. 1 is a plan view of the flexible master pattern used in the invention.

Fig. 2 is a cross-section taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view showing the plaster working mould being cast from the flexible master pattern.

Fig. 4 is a cross-sectional view and

Fig. 5 is a plan view of the plaster working mould.

Figs. 6, 7, 8 and 9 are sectional detail views showing the several steps in the moulding of the tooth.

Figs. 10 and 11 are sectional views showing how grooves or striations to simulate natural faults can be produced, Fig. 10 being a section on the line 10—10 of Fig. 1 and Fig. 11 a section on the line 11—11 of Fig. 10.

According to the invention, a master pattern 1 is provided. This pattern is characterized by being made from an elastic or flexible material and has the projecting tooth forms 2 moulded thereon in the flexible material as shown in Figs. 1 and 2. It is supported in a mould casing or box 3.

To mould the teeth, a plaster working mould 4 is first produced. This mould is prepared by fitting a flask section 5 over the flexible master pattern 1 as shown in Fig. 3 and pouring the plaster mixture 6 into same around the tooth forms 2. After the plaster has hardened, the flexible master pattern 1 is pulled from the plaster mould leaving the latter as shown in Figs. 4 and 5 with the undercut tooth cavities 7 as formed therein.

The flexibility of the master pattern

[Price 2/-]

enables it to be readily pulled or removed from the plaster mould 4 without damaging the latter and notwithstanding the undercut shape of the tooth cavities 7. This is an important feature as it enables the teeth to be moulded substantially upright and so facilitates the moulding of the facing and dentine portions of the tooth in one operation in accordance with the invention.

In moulding the teeth, the material 8 to form the tooth facing is first poured into the cavities 7 of the plaster working mould 4 as shown in Fig. 7 and spread along the face portion 9 of the cavity and into the apex 10 which forms the incisal tip of the tooth. The basic or dentine-forming material 11 is then added as shown in Fig. 8 and the whole wetted with the liquid monomer and allowed to stand for a sufficient period to allow it to permeate through the whole body of material in the tooth cavity and form a plastic mass.

A top presure plate 12 is then applied over the plaster mould and clamped thereto with sufficient pressure to compress the material in the cavities 7. The teeth are then " cured " by heat in the usual manner.

The pressure plate 12 is then removed and the upper surface 13 of the plaster working mould with the embedded teeth shaved to present a clean and flat surface on the moulded teeth. The teeth are finally removed by fracturing the plaster working mould and polished.

It will be appreciated that the material 8 first poured into the cavities 7 is such as will produce a substantially transparent or translucent facing to resemble the natural enamel of the tooth. Similarly, the dentine-forming material 11 will include a filler to resemble the natural dentine portion of a tooth and may, for the same purpose, be more deeply colored than the transparent facing.

Natural faults may be simulated in the moulded teeth by forming grooves or striations 14 in the surface of the facing material 8 in the cavity 7 by means of a suitable tool prior to the addition of the basic or dentine-forming material 11. Figs. 10 and 11 show the formation of such grooves or striations. When the dentine-forming material 11 is added the facing is thinner at the point where the striation 14 has been formed and the deeper colour of the dentine-forming material shows through the substantially transparent facing, the variation in the color thus giving the appearance of a natural fault in the tooth.

If desired, the pressure plate 12 may carry a series of pins 15, one corresponding to each tooth cavity, to mould a recess 16 in the back of the tooth. Said recess is useful for keying purposes when the teeth are being moulded onto the denture or plate.

By means of the invention, as described, faced artificial teeth of methyl methacrylate or like plastic can be produced more expeditiously and at lower cost than hitherto. Moreover, the teeth are moulded upright which is found to improve the quality and general appearance of the finished tooth. In this respect, the full contour of the incisal tip is retained whereas, in the previous methods of manufacture where the teeth are moulded flatwise and the facing moulded separately, the removal of the facing fin from the incisal tip distorts the contour.

I am aware that elastic or flexible patterns for producing plaster moulds are known and I make no claim to such patterns *per se* or to their use except as herein described and claimed.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of manufacturing faced artificial teeth from plastics such as methyl methacrylate which consists in casting from a permanent master pattern made from elastic or flexible material and having projecting tooth forms moulded thereon a temporary fracturable plaster working mould having a plurality of tooth cavities therein, pouring into said cavities first material to form the tooth facing and then basic or dentine-forming materials, rendering the material in each cavity plastic, applying pressure and " curing " both the face-forming and the denti-forming materials at the same time, and finally fracturing the plaster working mould to remove the finished teeth from the tooth cavities.

2. A method according to claim 1 wherein the teeth are moulded upright or substantially upright.

3. A method according to any of claims 1 and 2, wherein grooves or striations are formed in the surface of the facing-forming material in the tooth cavities in the plaster working mould prior to the addition of the basic or dentine-forming material to simulate natural faults in the moulded teeth.

4. An apparatus for carrying out the method according to any of the claims 1 to 3 in the manufacture of artificial teeth from plastics such as methyl methacrylate and the like comprising a pattern made from an elastic or flexible material with projecting tooth forms moulded thereon

in the elastic material.

5. An apparatus according to claim 4 and comprising a plaster working mould cast from said mater pattern and having two cavities therein to receive the mouldable materials.

6. A faced artificial tooth manufactured according to the method claimed in any of claims 1 to 3, wherein the tooth is moulded from a plastic such as methyl methacrylate or the like and has its facing and its dentine portion moulded and " cured " at the same time.

7. A faced artificial tooth according to claim 6, wherein grooves or striations are formed in the surface of face-forming material prior to the addition of the basic or dentine-forming material to simulate natural faults in the moulded tooth.

8. The method of manufacturing faced artificial teeth from a plastic such as methyl methacrylate or the like substantially as herein described.

9. An apparatus for the manufacture of artificial teeth from a plastic such as methyl methacrylate or the like comprising a master pattern and a plaster working mould substantially as herein described with reference to Figures 1—5 of the accompanying drawings.

10. A faced artificial tooth manufactured from a plastic such as methyl methacrylate or the like substantially as herein described.

Dated this 26th day of August, 1947.

A. A. THORNTON & CO.,
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24/27, High Holborn, London, W.C.1.
For the Applicants.

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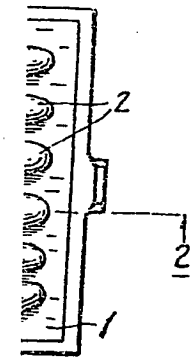
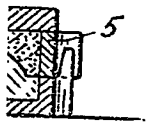
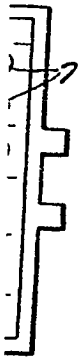
SHEET 1




2 SHEET
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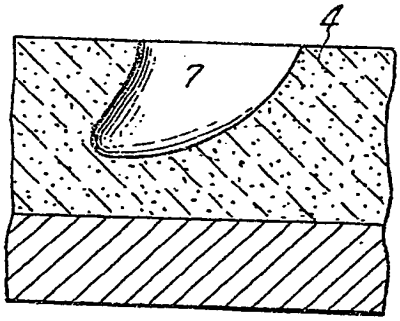
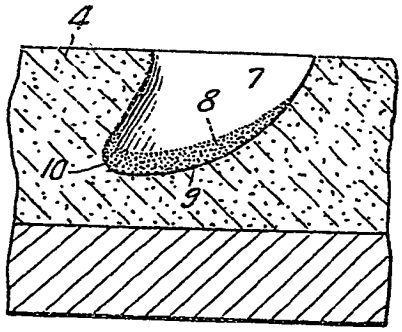



FIG.6.

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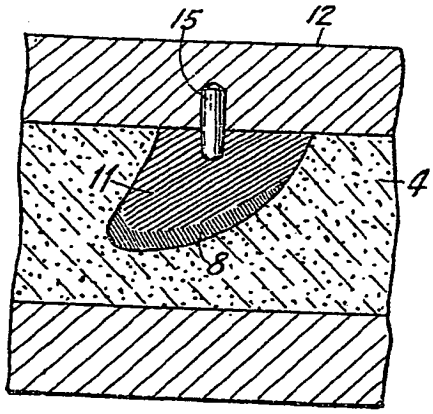


FIG.9.

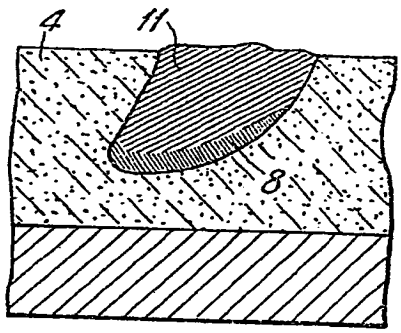


FIG.8.

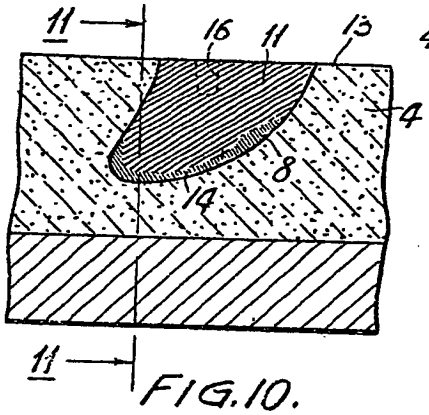


FIG.10.

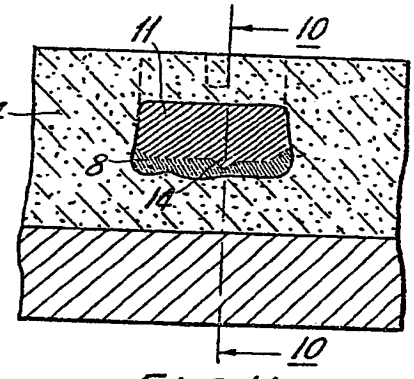


FIG.11

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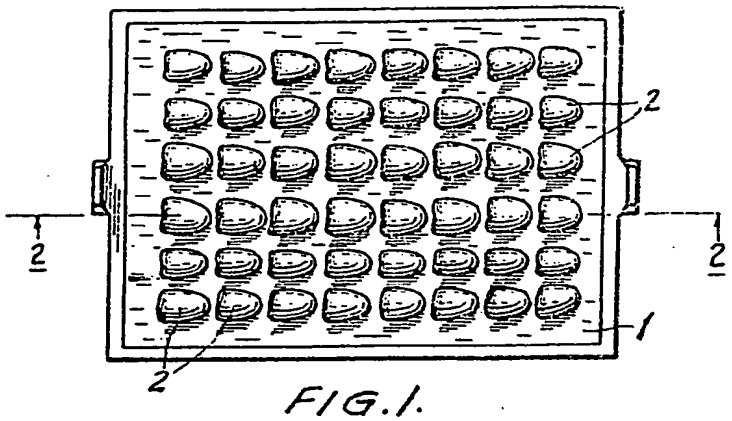



FIG. 1.

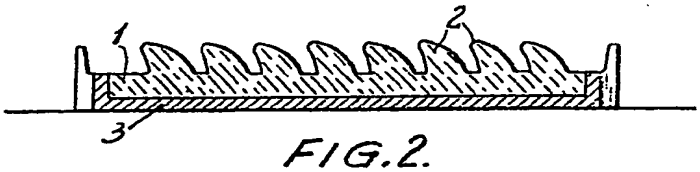



FIG. 2.

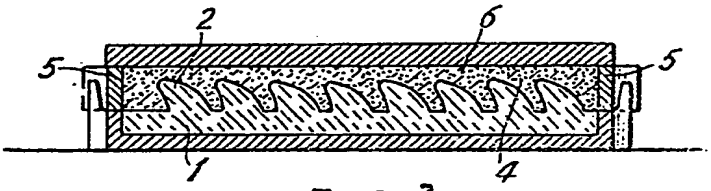
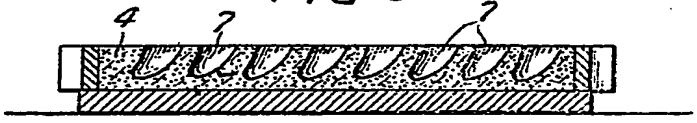



FIG. 3.

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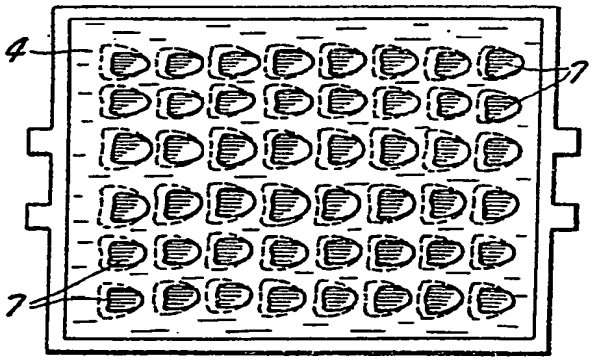


FIG. 5.

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2 SHEETS

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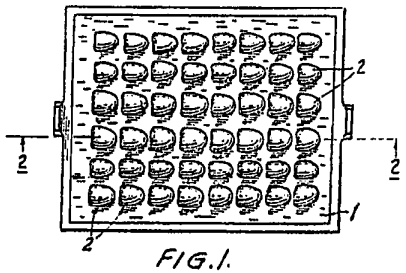


FIG.1.

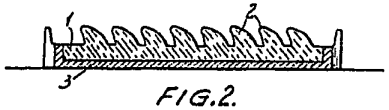
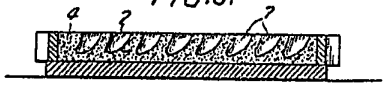


FIG.2.

FIG.3.



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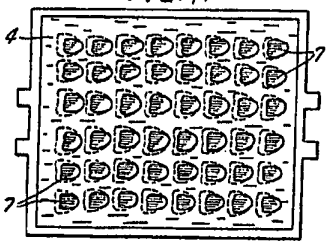


FIG.5.

SHEET 2

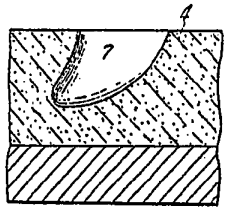
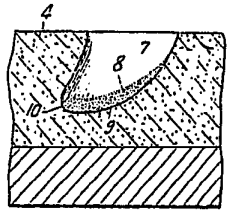


FIG.6.



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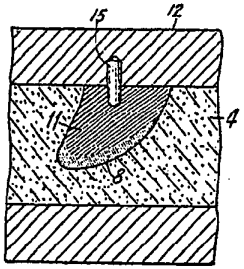

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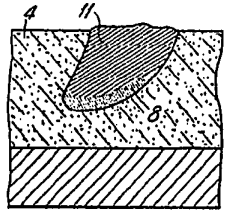

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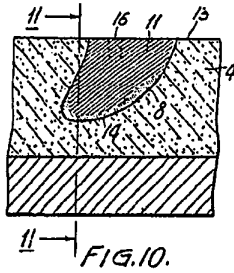

FIG.10.

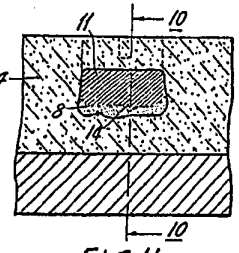

FIG.11.

[This Drawing is a reproduction of the Original on a reduced scale.]

H.M.S.O.(Ty.P.)